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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,802	10/15/2003	Johna Leddy	UIOWA-0055	1694

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EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 03/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/684,802	**Applicant(s)** LEDDY ET AL.	
	Examiner Raymond Alejandro	**Art Unit** 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _23 February 2006_.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-72_ is/are pending in the application.
4a) Of the above claim(s) _7-38, 41-47, 55, 57-72_ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _1-6,39,40,48-54 and 56_ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on _15 October 2003_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _03/22/04_.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Species I (claims 1-6, 39-40, 48-54 and 56) in the reply filed on 02/23/06 (*See page 3, 1st full paragraph*) is acknowledged. For purposes of prosecution, the examiner has accepted the specific claim grouping of claims with respect to the species presented by the applicant.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 03/22/04 was considered by the examiner.

Drawings

3. The drawings were received on 10/15/03. These drawings are acceptable.

Specification

4. The abstract of the invention is not descriptive. An abstract is required that is clearly indicative of the disclosed technical matter to which the claims are directed.

5. The use of the trademark "Nafion" (P. 13, 50, 53, 85, 92), "E-Tek" (P. 96), "Plexigas" (P. 95) has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

6. The disclosure is objected to because of the following informalities: it does not contain specific descriptions of Figures 3A-B, 4A-B and 5A-B.

Appropriate correction is required.

7. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: claim 56 requires that the catalytic component be present in an amount between 0.1 and 0.8 mg/cm^2. However, end value 0.8 mg/cm^2 does not have proper antecedent in the specification as filed. For example, neither paragraph 0049 nor the examples mention such end value. Adequate correction is required.

Claim Objections

8. Claims 1-6, 39-40, 48-54 and 56 objected to because of the following informalities: the abbreviation "*MEA*" should be removed from the claims and the limitation encompassing such abbreviation presented by using its standard nomenclature. Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-6, 39-40, 48-54 and 56 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. The language "*an effective amount of at least one catalyst component*" in claim 1 (two occurrences) is a relative term which renders the claim indefinite. The foregoing language is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For instance, the examiner notes that paragraph 0042 states that "*...the effective amount of catalyst component...may therefore vary from application to application depending upon factors such as the particular fuel employed and the particular composition of the catalytic material...*". However, absent the particular fuel and/or particular catalyst material from the present claims, it is noted that such an effective amount of catalyst material is indefinite.

12. The term "*substantial*" in claim 1 (two occurrences) is a relative term which renders the claim indefinite. The term "*substantial*" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The specific degree or magnitude intended by the term "*substantial*" is unclear and the specification as filed fails to ascertain it.

13. Claim 1 recites the limitation "*the surface*" in line 9. There is insufficient antecedent basis for this limitation in the claim. Since claim 1 contains earlier recitations of "a portion of a first surface" and "a portion of a surface", it would be unclear as to what specific surface the present claim and subsequent claims intend to recite.

14. The terms "*in an amount sufficient to*" and "*produces sufficient water to*" in claim are a relative term which renders the claim indefinite. The foregoing terms are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The specific degree or magnitude intended by the term "*sufficient*" is unclear and the specification as filed fails to ascertain it.

15. Moreover, given that claim 1 appears to be drafted in such a way of including certain number of limitations subject to a relative interpretation thereof, it is further contended that claim 1 is indefinite and vague for failing to specifically point out and accurately apprise the intended scope of the claims. The synergistic effect of having so many relative terms in one independent claim does not permit to reflect the requisite degree of the claimed subject matter in a clear, accurate, concrete and fair manner.

16. Claims 48-53 are indefinite because the recitation "*the maximum thickness*" in combination with the claimed range (i.e. "*less than...*"; or "*between 1 mil and 7 mils*"; or "*about*") does not clearly set forth the metes and bounds of the patent protection desired.

Claim Rejections - 35 USC § 102

17. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

18. Claims 1-3, 5-6, 39-40, 48 and 54 are rejected under 35 U.S.C. 102(b) as being anticipated by Voss et al 5441819.

The present claims are directed to a self-hydrating membrane electrode assembly wherein the disclosed inventive concept comprises the specific water passing characteristic thereof.

As to claim 1:

Voss et al disclose a membrane electrode assembly 11 comprising an electrolyte in the form of a solid polymer ion exchange membrane 12 disposed between a pair of conductive electrode sheets (COL 7, lines 14-23). A solid polymer ion exchange membrane disposed between the anode and the cathode for facilitating migration of hydrogen ions from the anode to the cathode and wherein the membrane is permeable to water (COL 3, lines 45-50). Water accumulated at the cathode is drawn by a concentration gradient toward the anode across the membrane and is absorbed as water vapor into the hydrogen containing gas supply (COL 3, lines 50-60).

It is disclosed that the electrochemical fuel cell comprises an anode having a catalyst associated therewith for producing hydrogen ions from a hydrogen containing gas supply; a cathode having a catalyst associated therewith for producing anions from an oxygen containing gas supply (COL 3, lines 30-45).

Examiner's note: *it is noted that sufficient water is produced at the cathode side as a result of the electrochemical reaction occurring thereon and such water is sufficient to maintain a satisfactory level of hydration in the anode.*

Voss et al further disclose the incorporation of additional ingredients into the electrodes, those ingredients are hydrophobic polymers such as Teflon brand polytetrafluoroethylene and/or a dispersing agent Teflon 30B (COL 7, lines 49-60). *It is contended that the disclosed additional ingredients are capable of imparting ion conductivity thereto.*

As to claims 2-3:

Voss et al use Pt as a catalytic material (COL 7, lines 60-65). Disclosed is that each carbon fiber paper sheet for operation as the anode 20 and cathode 22 uses Pt (COL 7, lines 60-64).

As to claims 5-6:

Voss et al further disclose the incorporation of additional ingredients into the electrodes, those ingredients are hydrophobic polymers such as Teflon brand polytetrafluoroethylene and/or a dispersing agent Teflon 30B (COL 7, lines 49-60). *It is contended that the disclosed additional ingredients are capable of imparting ion conductivity thereto.*

Voss et al disclose that is known to use a perfluorosulfonic ion exchange membrane such as Nafion as the electrolyte membrane (COL 7, lines 24-28). *Furthermore, given that the layer of catalytic material is in direct contact with the electrolyte membrane, it is contended that mixing of catalytic material and electrolyte membrane occurs at the interface formed therebetween. Thus, the catalytic material contains such electrolyte membrane at least at the interface.*

As to claims 39-40:

Voss et al disclose that is known to use a perfluorosulfonic ion exchange membrane such as Nafion as the electrolyte membrane (COL 7, lines 24-28).

As to claims 48:

Voss et al disclose that membrane 12 may have a thickness of about 0.01 inches or less because it has been found that thinner membranes significantly improve fuel cell efficiency (COL 7, lines 28-32). *It is noted that 0.01 inches is equivalent to 10 mil.*

As to claim 54:

The reaction of Voss involves the flux of reactants such as fuel gas and oxidant gas (COL 3, lines 30-49). *Absent further specific material description from the claim, it is contended that the flow and/or flux of reactant materials satisfy the claimed requirement.*

Thus, the claims are anticipated.

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

21. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voss et al 5441819 as applied above to claim 2 and further in view of Dhar 5242764.

The teachings of Voss et al as seen supra are incorporated herein by reference. However, Voss et al does not disclose the anode and cathode having different catalyst; and does not explicitly disclose the catalytic material comprising the ion conducting material (*this is presented hereinbelow just in case that applicant contends that Voss et al does not explicitly disclose ion conducting material in the catalytic material per se*).

Concerning claim 4:

Dhar also discloses that the hydrogen electrode catalyst is Pt and the oxygen electrode catalyst is another oxygen reducing catalyst such as a macrocyclic chelate compound (COL 4, lines 50-59).

Concerning claim 5:

Dhar discloses solid polymer fuel cells wherein a proton conducting material is deposited as the electrolyte on top of the catalytic side of the electrodes acting as the anode and cathode (ABSTRACT). The electrodes have deposits of solid electrolyte thereon (COL 4, lines 8-14).

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the different catalyst materials in the anode and cathode (the cathode catalyst and the anode catalyst are not the same) of Voss et al because Dhar teaches that, in fuel cells, an anode and a cathode use different catalyst materials to improve fuel cell performance. Thus, Dhar directly teaches the use of an anode catalyst which is different from the cathode catalyst.

As far as the ion conducting material, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the catalytic material comprising the ion conducting material of Dhar in the membrane electrode assembly of Voss et al as Dhar discloses that a proton conducting material deposited as the electrolyte on top of the catalytic side of the electrodes acting as the anode and cathode serves to separate the anode from the cathode. Thus, Dhar provides specific guidance that ion conducting materials incorporated in electrode catalyst material are helpful to further separate the anode side of the fuel cell from the cathode side thereof, thereby avoiding detrimental or catastrophic damages to the fuel cell.

22. Claims 49-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voss et al 5441819 as applied above to claim 39.

The teachings of Voss et al as seen supra are incorporated herein by reference. However, Voss et al does not expressly disclose the specific thickness of membrane as recited in claims 49-53.

As to claims 49-53:

Voss et al disclose that membrane 12 may have a thickness of about 0.01 inches or less because it has been found that thinner membranes significantly improve fuel cell efficiency (COL 7, lines 28-32). *It is noted that 0.01 inches is equivalent to 10 mil.*

In view of the above, it would have been obvious to a person possessing an ordinary level of skill in the pertinent art to make the membrane of Voss et al by the specific thickness of membrane as recited in claims 49-53 because Voss et al directly teach that membrane 12 may have a thickness of about 0.01 inches or less because it has been found that thinner membranes significantly improve fuel cell efficiency. Thus, Voss et al mention that membranes with a thickness of less than 0.01 inches (10 mil) are also desirable for the benefit of improving the efficiency of the fuel cell. In this case, a prima-facie case of obviousness does exit because Voss et al suggest to further reduce the thickness of the electrolyte membrane for specific purposes as those mentioned above. Therefore, Voss et al directly teach the use of a thickness within the claimed range. (***See In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997*). *See also MPEP 2144.05 [R-3] Obviousness of Ranges.***

23. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Voss et al 5441819 as applied above to claim 2 and further in view of Biegert et al 2004/0241531.

The teachings of Voss et al as seen supra are incorporated herein by reference. However, Voss et al does not explicitly disclose the specific amount of the catalytic component.

Biegert et al disclose that is known to use catalyst materials with a degree of loading between (*in the amount of*) 0.4 mg/cm^2 and 4 mg/cm^2 in membrane electrode assemblies for self-humidifying fuel cells (P. 0026 & 0018).

In this case, it is noted that, at least, the end point (i.e. 0.4 mg/cm^2) constitutes a valid data point and thus it full encompasses the claim as the end point represents a specific disclosure of a discrete embodiment of the invention disclosed by the prior art which amounts to a complete description and, therefore, an anticipation of the claimed range. ***See Ex Parte Lee 31 USPQ2d 1105.***

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the specific amount of the catalytic component of Biegert et al in the membrane electrode assembly of Voss et al because Biegert et al discloses that such specific catalyst amount improves current/voltage characteristics of the membrane electrode assembly using the same. As such, the performance of the membrane electrode assembly is improved.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
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